

**APPLICATION FOR UNITED STATES LETTERS PATENT**

**TITLE: CYCLONE-TYPE DUST COLLECTING APPARATUS FOR  
VACUUM CLEANER**

**INVENTOR: Byung-jo Lee**

**ASSIGNEE: SAMSUNG GWANGJU ELECTRONICS CO., LTD.**

**BLANK ROME LLP  
The Watergate  
600 New Hampshire Avenue, NW  
Washington, DC 20037  
(202) 772-5800  
(202) 572-8398 (facsimile)**

**Docket No. 116511-00113**

# **CYCLONE-TYPE DUST COLLECTING APPARATUS FOR VACUUM CLEANER**

## **Field of the Invention**

The present invention relates to a vacuum cleaner, and more particularly, to a  
5 cyclone-type dust collecting apparatus for a vacuum cleaner disposed at an extension  
pipe of the vacuum cleaner for separating and collecting foreign substances (hereinafter  
called 'dust') included in the air by generating a cyclone stream in the drawn air.

## **Background of the Invention**

10 As shown in FIGs. 1 and 2, a conventional cyclone-type dust collecting  
apparatus 10 for a vacuum cleaner comprises a cyclone body 20, a dust collecting  
receptacle 30, and a grill assembly 40.

The cyclone body 20 comprises an air inlet pipe 21 connected to an extension  
pipe 1a (See FIG. 2) of the suction port side of the vacuum cleaner, an air discharge  
15 pipe 22 connected to an extension pipe 1b of the vacuum cleaner body side, an air inlet  
port 23 fluidly communicating with the air inlet pipe 21, and an air discharge port 24  
fluidly communicating with the air discharge pipe 22, where the cyclone body 20  
generates a cyclone stream in the dust-laden air drawn in through the air inlet port 23.

The dust collecting receptacle 30 is removably connected to the cyclone body 20  
20 and collects dusts separated from air by the cyclone stream formed by the cyclone body  
20.

The grill assembly 40 is mounted at an end of the air discharge port 24 inside the  
cyclone body 20 and prevents the dusts collected in the dust collecting receptacle from  
flowing back through the air discharge port 24. The grill assembly 40 comprises a grill

body 41, a plurality of paths 42 formed on the outer circumferential surface of the grill body 41 to fluidly communicate with the air discharge port 24, and a dust blocking member 43 disposed at an end of the grill body 41.

Such conventional cyclone-type dust collecting apparatus for a vacuum cleaner structured as above has the air inlet and discharge pipes 21, 22 fluidly communicating with the extension pipes 1a, 1b of the vacuum cleaner as shown in FIG. 3. Accordingly, dusts, together with air, are drawn in through the air inlet pipe 21 in an oblique direction with respect to the cyclone body 20 by a suction force generated at a suction port E of the vacuum cleaner, and the drawn in air flows towards the bottom of the dust collecting receptacle 30 forming a cyclone stream. In this process, the dusts included in air are separated from air by a centrifugal force and collected in the dust collecting receptacle 30. Air flows towards the cleaner body B through the paths 42 of the grill assembly 40, air discharge port 24, and air discharge pipe 22 by the cyclone stream reversed at the bottom of the dust collecting receptacle 30 and rising up having a radius smaller than that of the descending cyclone stream.

The cleaned air towards the cleaner body B is discharged outside through a paper filter (not shown) provided in the cleaner body B, and thus, fine dusts which are not separated by the cyclone dust collecting apparatus is filtered by the paper filter and collected.

Such cyclone-type dust collecting apparatus is capable of reducing the amount of dusts collected by the paper filter as the dusts in air drawn in through the suction port E of the cleaner is initially separated and collected before the paper filter of the cleaner body B filters the dusts.

However, such conventional cyclone-type dust collecting apparatus cannot prevent fine dusts smaller than the paths 42 flowing back through the paths 42 together

with the discharged air although it can effectively separate and collect the dusts larger than the paths 42 of the grill assembly. As a result, reversing fine dusts are collected in the paper filter provided in the cleaner body B and the amount of the dusts collected in the paper filter increases. Accordingly, the life span of the paper filter is shortened and  
5 an improvement with respect to such a problem is required.

### SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a cyclone type dust collecting apparatus for a vacuum cleaner, which has a second filtering means for  
10 filtering the minute dusts in air reversing along the air path of the grill assembly, and thereby reducing the amount of dusts to be filtered at the paper filter and extending the life span of the paper filter.

In order to achieve the above object and/or other features of the present invention, there is provided a cyclone type dust collecting apparatus for a vacuum  
15 cleaner including a cyclone body comprising an air inlet port and air discharge port, thus forming a cyclone stream in air including dust drawn in through the air inlet port. A dust collecting receptacle is removably connected to the cyclone body for collecting dust separated from air by the cyclone stream. A grill assembly is disposed at an end of the air discharge port inside the cyclone body for preventing dusts from being flowing  
20 back through the air discharge port of the cyclone body, and a fine dust filtering means disposed at a downstream end of the grill assembly of the cyclone body for separating fine dusts which has not been separated by the grill assembly.

The fine dust filtering means includes a filter mounting portion formed on the cyclone body and has an opening portion open in a direction orthogonal with respect to

the air discharge port, and a filter assembly removably inserted into the filter mounting portion.

The filter assembly includes a filter case having an external shape corresponding to a shape and structure of the filter mounting portion, and a fine dust filter connected to the filter case.

A part of the filter case which comes in contact with the opening portion of the filter mounting portion has a packing member disposed thereon for sealing.

A grip portion is provided on a front surface of the filter case for easy handling.

As the cyclone type dust collecting apparatus has relatively large particles of dusts separated from the drawn air by the grill assembly, and fine dusts separated secondly from air by the fine dust filtering means disposed at a downstream end of the grill assembly, it thus has less dust presented to the cleaner body. As a result, the amount of dust to be filtered at the paper filter is greatly reduced.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above aspects and other features of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings, in which:

FIG. 1 is an exploded perspective view showing a general cyclone-conventional type dust collecting apparatus for a vacuum cleaner;

FIG. 2 is a sectional view showing FIG. 1 assembled;

FIG. 3 is a perspective view showing a general conventional cyclone-type dust collecting apparatus for a vacuum cleaner mounted to an extension pipe of a canister-type vacuum cleaner;

FIG. 4 is an exploded perspective view showing a cyclone-type dust collecting apparatus for a vacuum cleaner according to an embodiment of the present invention; and

FIG. 5 is a sectional view showing FIG. 4 assembled.

5

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, the present invention will be described in detail with reference to the accompanying drawings. With respect to the elements identical to those of the cyclone-type dust collecting apparatus shown in FIGs. 1 through 3, like reference  
10 numerals will be assigned and the detailed description thereof will be omitted.

As shown in FIGs. 4 and 5, the cyclone-type dust collecting apparatus 10 for a vacuum cleaner according to one embodiment of the present invention comprises a cyclone body 20, a dust collecting receptacle 30, a grill assembly 40 and a fine dust filtering means 50.

15 The cyclone body 20 comprises an air inlet pipe 21 connected to an extension pipe 1a (See FIG. 5) of the suction port side of the vacuum cleaner, an air discharge pipe 22 connected to an extension pipe 1b of the vacuum cleaner body side, an air inlet port 23 fluidly communicating with the air inlet pipe 21, and an air discharge port 24 fluidly communicating with the air discharge pipe 22, where the cyclone body 20  
20 generates a cyclone stream in the dust laden air drawn in through the air inlet port 23.

The dust collecting receptacle 30 is removably connected to the cyclone body 20 and collects dusts separated from air by the cyclone stream formed by the cyclone body 20.

The grill assembly 40 is mounted at an end of the air discharge port 24 inside the cyclone body 20 and prevents the dusts collected in the dust collecting receptacle from flowing back through the air discharge port 24. Such grill assembly 40 comprises a grill body 41, a plurality of paths 42 formed on the outer circumferential surface of the grill body 41 to fluidly communicate with the air discharge port 24, and a dust blocking member 43 disposed at an end of the grill body 41.

The fine dust filtering means 50 separates the fine dust flowing back through the paths 42 of the grill assembly 40 without prior separation by the grill assembly 40, and comprises a filter mounting portion 60 and a filter assembly 70.

10 The filter mounting portion 60 is disposed at one side of the cyclone body 20, and has an opening portion 60a open in the direction orthogonal with respect to the air discharge port 24.

The filter assembly 70 is removably inserted into the filter mounting portion 60, and separates fine dust included in the discharged air through the air discharge port 24.

15 The filter assembly 70 comprises a filter case 71 and a fine dust filter 72.

The filter case 71 has an external shape corresponding to the shape and structure of the filter mounting portion 60, and the fine dust filter 72 is fixed to the filter case 71. It is preferable that the fine dust filter 72 is made of a porous material such as sponge. In addition, it is preferable that a part of the filter case 71 which comes in contact with the opening portion 60a of the filter mounting portion 60 has a packing member 71a disposed thereon for sealing. The reference numeral 71b in FIG. 4 is a grip portion enabling easy handling of the filter assembly 70.

20

The cyclone-type dust collecting apparatus for a vacuum cleaner structured as above according to the present embodiment has air inlet pipe 21 and air discharge pipe 22 fluidly communicating with the extension pipes 1a, 1b of the vacuum cleaner as

25

shown in FIGs. 3 and 5. Accordingly, dusts, together with air, are drawn in through the air inlet pipe 21 in an oblique direction with respect to the cyclone body 20 by a suction force generated at a suction port E of the vacuum cleaner, and the drawn air flows towards the bottom of the dust collecting receptacle 30 forming a cyclone stream. In this process, the dusts included in air is separated from air by a centrifugal force and collected in the dust collecting receptacle 30.

Air, from which dusts are initially separated by the above operation, flows towards the cleaner body B through the paths 42 of the grill assembly 40, the fine dust filtering means 50 and air discharge pipe 22, is disposed at the air discharge port 24, and by the cyclone stream is reversed at the bottom of the dust collecting receptacle 30, and thus rising up with a radius smaller than that of the descending cyclone stream.

The fine dusts still remaining in the discharged air after the grill assembly 40 are separated secondly by the fine dust filtering means 50 of the filter assembly 70. Air cleaned at the above two stages is discharged towards the cleaner body B.

Air discharged towards the cleaner body B is finally discharged outside via a paper filter provided in the cleaner body B.

As described above, the cyclone-type dust collecting apparatus for a vacuum cleaner according to the present invention has relatively large particles of dusts separated from the drawn air by the grill assembly and fine dusts secondly separated from the air by the fine dust filtering means, and thus has the amount of dusts presented to the cleaner body significantly reduced.

According to the present invention as described above, fine dust filtering operation by the fine dust filtering means significantly reduces the amount of dusts flowing towards the cleaner body and therefore extends the life span of a paper filter.



Accordingly, the number of paper filters changed may be reduced and the life span of a paper filter can be extended thereby reducing the maintenance costs.

Although a few preferred embodiments of the present invention have been illustrated and described, it will be understood by those skilled in the art that the present  
5 invention should not be limited to the described preferred embodiments, but various changes and modifications can be made within the spirit and scope of the present invention as defined by the appended claims.